

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

CORRECTED VERSION

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
13 April 2006 (13.04.2006)

PCT

(10) International Publication Number
WO 2006/038756 A1

(51) International Patent Classification:
A47L 15/42 (2006.01)

(21) International Application Number:
PCT/KR2005/001271

(22) International Filing Date: 2 May 2005 (02.05.2005)

(25) Filing Language: Korean

(26) Publication Language: English

(30) Priority Data:
10-2004-0030949 3 May 2004 (03.05.2004) KR

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KM, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY,
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU,
ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,
SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,
GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

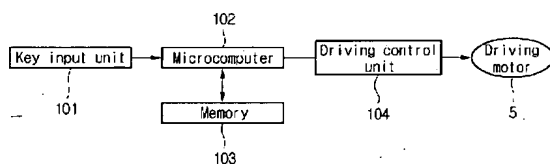
— with international search report

(48) Date of publication of this corrected version:
16 November 2006

(15) Information about Correction:
see PCT Gazette No. 46/2006 of 16 November 2006

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: DISH WASHER AND DISPLAY STRUCTURE THEREOF



(57) Abstract: A display structure of a dishwasher is provided. The display structure includes a cabinet, a door, a top table, and a refraction unit. The door is rotatably mounted on a front side of the cabinet and has a display formed on an upper side thereof. The top table covers the upper side of the door and has a hole of a predetermined size formed on a portion that contacts the display. The refraction unit is inserted the hole formed on the top table to allow light from the display to be refracted. With the above construction, since a user can see the display attached on the upper side of the door with the door closed for washing, a washing progress state can be known.

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【DESCRIPTION】**【Invention Title】**

DISH WASHER AND DISPLAY STRUCTURE THEREOF

【Technical Field】

The present invention relates to a dishwasher, and more particularly, to a top-control type dish washer having a display structure that allows an operation state of the dishwasher to be known even when a door is closed.

【Background Art】

Generally, a dishwasher is an electronic appliance for receiving dishes in a dish rack mounted in an inside of a tub and washing the dishes by spraying washing water to the inside of the tub at high pressure through a spraying nozzle.

FIG. 1 is a perspective view of an appearance of a related art dishwasher of a top-control type, and FIG. 2 is a partial perspective view of a dishwasher with part of a top table is cut.

Referring to FIGS. 1 and 2, the related art dishwasher 10 of a top-control type includes: a cabinet 11 constituting an appearance; a door 12 rotatably mounted on a front side of the cabinet 11; a handle 14 mounted on a front upper portion of the door, for opening/closing the door 12; and a top table 13 seated on the cabinet 11.

In detail, a display 15 for displaying an operation state of the dishwasher 10 is mounted on the upper side of the door 12. When the door 12 is closed, the display 15 is covered with the top table 13.

Therefore, when the door 12 is closed so as to operate the dishwasher 10 after the dishes are received in the inside of the washing tub, the display 15 is covered with the top table 13 and a washing state cannot be known during a washing operation.

【Disclosure】**【Technical Problem】**

Accordingly, the present invention is directed to a dishwasher and a display

structure thereof that substantially obviate one or more of the problems due to limitations and disadvantages of the related art.

An object of the present invention is to provide a top table structure of a dishwasher that allows a washing state in a washing tub to be checked by an eye of a user even when a door is closed for washing.

【Technical Solution】

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, there is provided a dishwasher including: a cabinet; a door rotatably mounted on a front side of the cabinet and having a display formed on an upper side thereof; a top table for covering the upper side of the door and having a hole of a predetermined size formed on a portion that contacts the display; and a refraction unit inserted into the hole formed on the top table, for refracting light from the display.

According to another aspect of the present invention, there is provided a display structure of a dishwasher, including: a tub having a washing tub formed therein; a cabinet enclosing a periphery of the tub; a door coupled to a front side of the cabinet and having a display formed on an upper side thereof, for showing a washing state; a top plate seated on the cabinet; an insertion hole formed vertically in a front side of the top plate in a passing through manner; a prism inserted into the insertion hole, for refracting light displayed on the display at a predetermined angle; and a drive unit mounted inside the top plate, for moving the prism in an up/down direction.

According to a further another aspect of the present invention, there is provided a display structure of a dishwasher, including: a door having a display on an upper side thereof; a top table for covering the upper side of the door and having a hole of a predetermined size right above the display; and a light transmission unit inserted into the hole formed on the top table, for allowing the display to be checked from an outside.

【Advantageous Effects】

With such a construction, since a user can see the display attached on the upper side of the door with the door closed for washing, a washing progress state can be known.

【Description of Drawings】

FIG. 1 is a perspective view of an appearance of a related art dishwasher of a top-control type;

FIG. 2 is a partial perspective view of a dishwasher with part of a top table is cut;

FIG. 3 is a sectional view of a dishwasher having a top-table structure of the present invention;

FIG. 4 is a perspective view of an appearance of a dishwasher having a display structure of the present invention;

FIG. 5 is a perspective view of a prism constituting a display of the present invention;

FIG. 6 is a display structure according to another embodiment of the present invention; and

FIG. 7 is a display structure according to further another embodiment of the present invention.

【Best Mode】

Hereinafter, preferred embodiments of the present invention will be described in detail with reference to accompanying drawings.

FIG. 3 is a sectional view of a dishwasher having a top-table structure of the present invention.

Referring to FIG. 3, the dishwasher 100 includes: a tub 110 constituting an appearance and having a washing tube formed therein; a cabinet 101 for enclosing an outside of the tub 110; a top table 113 seated on the cabinet 101; a prism 200 inserted into one side portion of the top table 113, for allowing a progress state

displayed on a display to be reflected; a door 111 formed on a front side of the cabinet 101, for opening/closing the washing tub; and a sump 170 formed in a lower central portion of the tub 110, for storing washing water.

Also, the dishwasher further includes: a washing pump 180 for pumping the washing water stored in the sump 170 using high pressure; and a motor 190 attached to a backside of the washing pump 180, for driving the washing pump.

Also, the dishwasher further includes: a water guide 140 serving as a path through which the washing water pumped by the washing pump 180 flows; a lower nozzle 160 disposed on the sump 170 and formed on a backside of the washing tub, for spraying the washing water upward; an upper nozzle 150 attached on an upper side portion of the water guide 140, extended from the water guide 140 in a direction perpendicular thereto, and positioned at a central portion of the washing tub; and a top nozzle 155 formed at a ceiling portion of the tub 110, for spraying the washing water vertically downward.

Also, the dishwasher further includes: an upper rack 120 mounted on the upper nozzle 150 so that dishes may be washed by the upper nozzle 150; and a lower rack 130 mounted on the lower nozzle 160 so that dishes may be washed by the lower nozzle 160.

In detail, the upper rack 120 is supported by a rail (not shown) provided on an inner side of the tub 110 to perform a back/forth motion.

In operation, a user opens the door 111 of the dishwasher 100 and pulls the upper rack 120 and/or the lower rack 130 to the outside. Next, dishes are received in the racks 120 and 130. After that, the door 111 is closed and power is applied, so that the dishwasher 100 may operate.

In the meantime, when the power is applied to the dishwasher 100 and a washing operation is performed, the washing water flows into the sump 170. When the washing water inflow operation is finished, the motor 190 operates. Next, an impeller (not shown) axially connected with the motor 190 and provided inside the

washing pump 180 rotates, so that the washing water is pumped to the lower nozzle 160 and the water guide 140.

The washing water pumped to the water guide 140 finally flows to the top nozzle 155 and the upper nozzle 150 and is sprayed into the washing tub. The dishes received in the racks 120 and 130 are washed by the sprayed washing water.

Here, the top nozzle 155 sprays the washing water vertically downward and the upper nozzle 150 sprays the washing water vertically upward, so that the dishes received in the upper rack 120 are washed.

Also, the lower nozzle 160 sprays the washing water vertically upward to wash the dishes received in the lower rack 130. A spraying hole is formed on a backside of the upper nozzle 150 so that the washing water may be sprayed in both directions and an upper side of the dishes received in the lower rack 130 can be simultaneously washed.

The contaminated washing water gathered in the sump 170 during the washing operation is filtered by a filter (not shown) so that foreign substance may be removed. The washing water in which the foreign substance has been filtered is discharged to the outside of the dishwasher 100 through a discharge pump (not shown) before a rinsing operation starts after the washing operation is completed.

When the washing operation is completed and the washing water is discharged to the outside, clean washing water flows into the sump 170 again through an inlet and is sprayed through the nozzles 150 and 160. The clean washing water rinses the dishes.

When the rinsing operation is finished, a drying operation is performed, so that the washing operation is completed.

FIG. 4 is a perspective view of an appearance of a dishwasher having a display structure of the present invention and FIG. 5 is a perspective view of a prism constituting a display of the present invention.

Referring to FIGS. 4 and 5, the dishwasher 100 includes: a cabinet 101; a door

111 rotatably mounted on a front side of the cabinet 101 and having a display mounted on an upper side thereof, for displaying a washing state; a handle 112 attached on a front side of the door 111; a top table 113 seated on the cabinet 101 and covering an upper side of the door 111 as well as the cabinet 101; and a prism 200 seated on an front side portion of the top table 113.

In detail, the prism 200 includes a shape of an about rectangular parallelepiped and an insertion hole 210 for receiving the prism 200 is formed in one side of the top table 113. Here, the shape of the prism 200 is not limited to the rectangular parallelepiped but various shapes can be applied. The insertion hole 210 is formed in a portion where the display mounted on the upper side of the door 111 is positioned, so that the prism 200 is seated right above the display. Therefore, a washing state displayed on the display is seen to an eye of a user by way of the prism 200.

In the meantime, a prism operation switch 220 for allowing the prism 200 to move in an up/down direction can be mounted on one side portion of the tub 110, a side portion of the door 111, or a side portion of the handle 112.

In detail, when a user presses the prism operation switch 220, the prism 200 can be raised and protruded above the top table 113. Also, the prism 200 inserted into the insertion hole 210 has a refraction plane 230 inclined a predetermined angle therein, so that a user can check the display even at a position spaced apart a predetermined distance from the prism without directly seeing the display at a position perpendicular to the top table 113.

In more detail, the refraction plane 230 is inclined inside the prism 200 such that a backward portion of the refraction plane 230 is higher than a forward portion thereof. That is, light or characters displayed on the display, for informing a washing state are emitted vertically upward in an inside of the prism 200 and refracted to the front direction of the dishwasher 100 through the refraction plane 230 to be seen to the eye of a user. Accordingly, when the prism 200 is raised,

a user can see and check the display through the refraction plane 230 sloppily mounted a predetermined angle inside the prism 200 of the top table 113. In other words, a user can see and check the washing state displayed on the display even at the front side of the dishwasher 100.

【Mode for Invention】

FIG. 6 is a display structure according to another embodiment of the present invention.

Referring to FIG. 6, a spring 240 is installed on a backside of the prism 200 inserted into the insertion hole 210, so that when a user presses the prism 200, the prism 200 can be protruded by elastic force of the spring 240. On the contrary, when a user presses the prism 200 again, the prism is lowered and restored back to an original position thereof so that the height of the prism may be the same as that of the top table 113.

FIG. 7 is a display structure according to further another embodiment of the present invention.

Referring to FIG. 7, a drive unit 250 is mounted on a backside of the prism 200 inserted into the insertion hole 210, so that the prism can move in an up/down direction.

In detail, the drive unit 250 includes: a step motor 253 rotatable in forward/backward directions; a gear 252 mounted on the rotational shaft of the step motor 253 to rotate; and a rack 251 engaged with the periphery of the gear 252, for performing a reciprocating motion in an up/down direction as the gear 252 rotates.

With such a construction, when a user presses the prism 200, the step motor 253 rotates and thus the gear 252 rotates, so that the rack 251 engaged with the teeth of the gear 252 moves upward. Also, when a user presses the prism 200 again, the step motor 253 rotates reversely to allow the rack 251 to move downward. By above-described mechanism, the prism 200 is raised or lowered whenever a user

presses the prism 200.

Here, the step motor 253 may operate when a user presses the prism 200, or may operate when a user presses a switch separately installed.

Using the above-described display structure, a user has convenience of easily knowing an operation state occurring inside the washing tub or an elapsing time even without opening the door after the dishwasher operates.

【Industrial Applicability】

The display structure is applied to the dishwasher having the display formed on the upper side of the door, for displaying the washing state, the display being covered by the top table and thus invisible. With the display structure, a user can check the washing state even without opening the door.

While the present invention has been described and illustrated herein with reference to the preferred embodiments thereof, it will be apparent to those skilled in the art that various modifications and variations can be made therein without departing from the spirit and scope of the invention. Thus, it is intended that the present invention covers the modifications and variations of this invention that come within the scope of the appended claims and their equivalents.

【CLAIMS】**【Claim 1】**

A dishwasher comprising:

a cabinet;

a door rotatably mounted on a front side of the cabinet and having a display formed on an upper side thereof;

a top table for covering the upper side of the door and having a hole of a predetermined size formed on a portion contacting the display; and

a refraction unit inserted into the hole formed on the top table, for refracting light from the display.

【Claim 2】

The dishwasher according to claim 1, wherein the refraction unit is a transparent prism.

【Claim 3】

The dishwasher according to claim 1, wherein the refraction unit has a shape of an about rectangular parallelepiped.

【Claim 4】

The dishwasher according to claim 1, wherein the refraction unit has a refraction plane formed sloppily at a predetermined angle therein so that a user checks the display even at a position spaced apart a predetermined distance from the top table.

【Claim 5】

The dishwasher according to claim 1, further comprising:

a handle mounted on a front side of the door; and

a switch formed on one side of the door, for allowing the refraction unit to be raised or lowered.

【Claim 6】

The dishwasher according to claim 1, further comprising:

a spring unit mounted on a backside of the refraction unit, for allowing the

refraction unit to be raised a predetermined height when a user presses the refraction unit and allowing the refraction unit to be lowered to an original position thereof when a user presses the refraction unit again.

【Claim 7】

The dishwasher according to claim 1, further comprising:

a drive unit mounted on a backside of the refraction unit, for allowing the refraction unit to be raised a predetermined height when a user presses the refraction unit and allowing the refraction unit to be lowered to an original position thereof when a user presses the refraction unit again.

【Claim 8】

The dishwasher according to claim 1, further comprising a switch formed on one side of the cabinet, for allowing the refraction unit to be raised or lowered.

【Claim 9】

The dishwasher according to claim 4, wherein the refraction plane has a configuration such that a backward portion thereof is higher than a forward portion thereof.

【Claim 10】

A display structure of a dishwasher, comprising:

a tub having a washing tub formed therein;
a cabinet enclosing a periphery of the tub;
a door coupled to a front side of the cabinet and having a display formed on an upper side thereof, for displaying a washing state;
a top plate seated on an upper side of the cabinet;
an insertion hole formed vertically in a front side of the top plate in a passing through manner;
a prism inserted into the insertion hole, for refracting light displayed on the display at a predetermined angle; and
a drive unit mounted inside the top plate, for moving the prism in an up/down

direction.

【Claim 11】

The display structure according to claim 10, wherein the drive unit comprises a spring mounted on a backside of the prism.

【Claim 12】

The display structure according to claim 10, wherein the drive unit comprises:
a drive motor;
a gear connected with a rotational shaft of the drive motor; and
a rack engaged with the gear, for moving in an up/down direction.

【Claim 13】

The display structure according to claim 12, wherein the drive motor is a step motor rotatable in forward/backward directions.

【Claim 14】

The display structure according to claim 10, further comprising a switch mounted on a side portion of the door, for allowing the prism to be movable in an up/down direction.

【Claim 15】

The display structure according to claim 10, wherein the prism comprises a transparent body through which light passes.

【Claim 16】

A display structure of a dishwasher, comprising:
a door having a display on an upper side thereof;
a top table for covering the upper side of the door and having a hole of a predetermined size right above the display; and
a light transmission unit inserted into the hole formed on the top table, for allowing the display to be checked from an outside.

【Claim 17】

The display structure according to claim 16, wherein the light transmission unit

comprises a transparent body to refract light emitted from the display at a predetermined angle.

【Claim 18】

The display structure according to claim 16, wherein the light transmission unit reciprocates vertically in an inside of the hole.

【Claim 19】

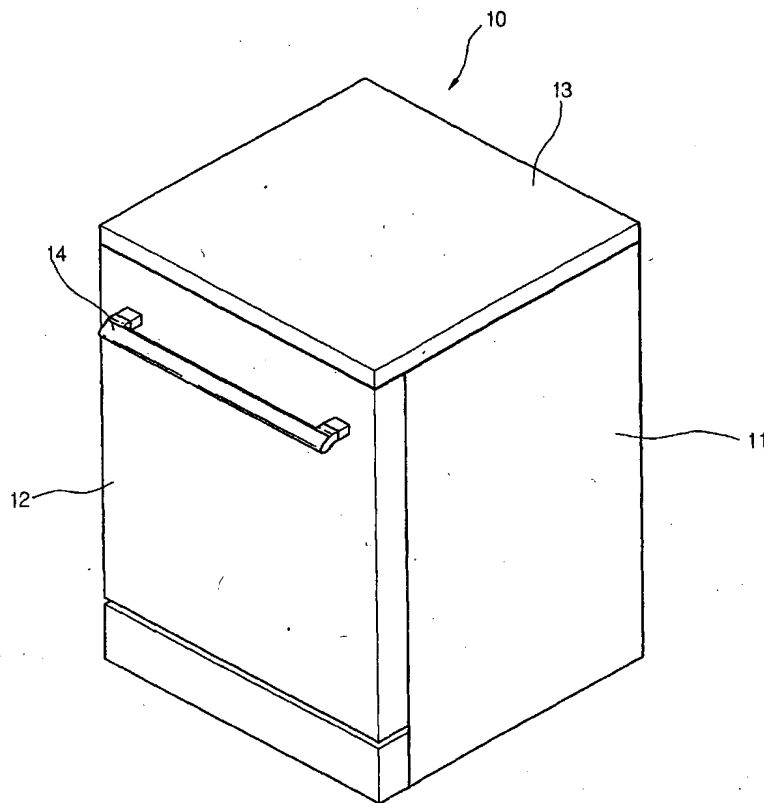
The display structure according to claim 16, further comprising a drive unit mounted on a backside of the light transmission unit, for allowing the light transmission unit to be raised or lowered.

【Claim 20】

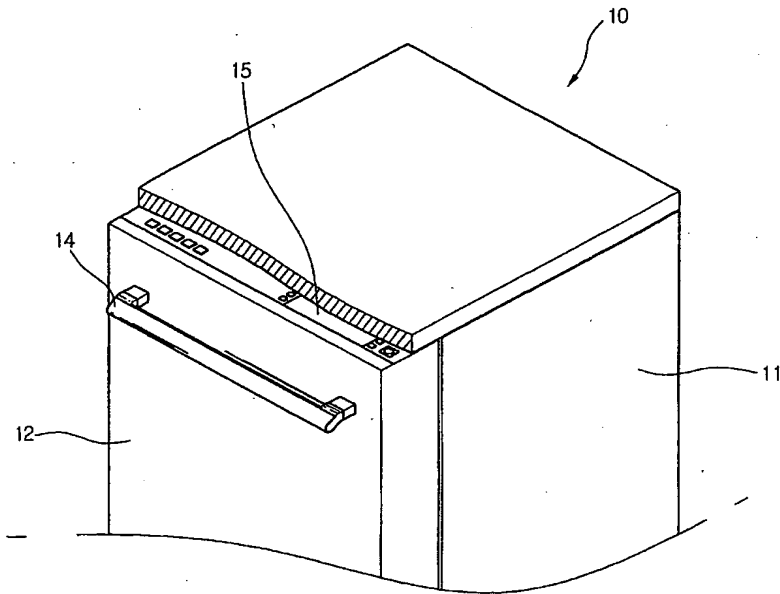
The display structure according to claim 19, further comprising a switch for controlling driving of the drive unit.

【DRAWINGS】

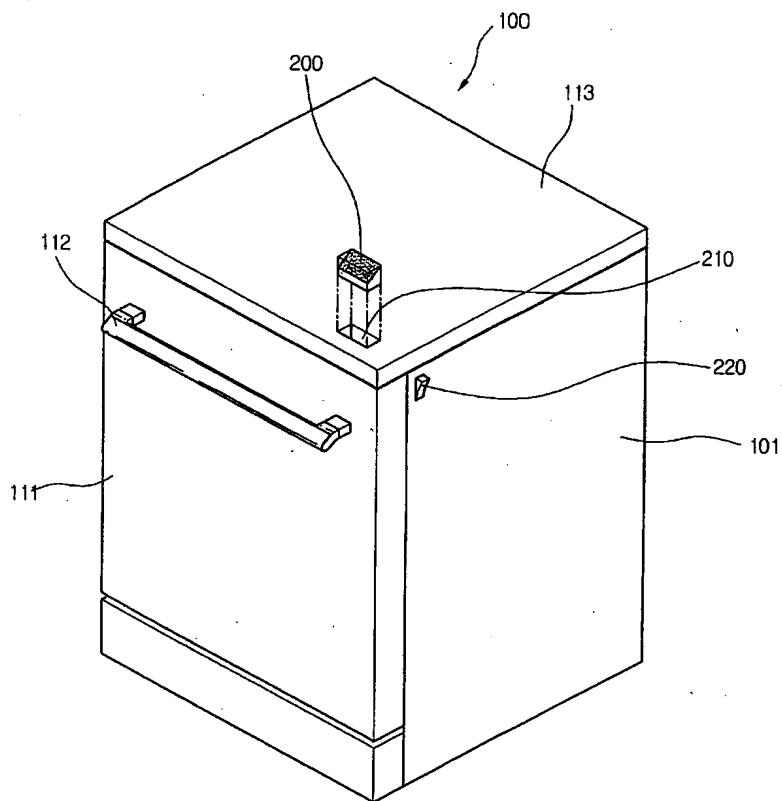
【Figure 1】



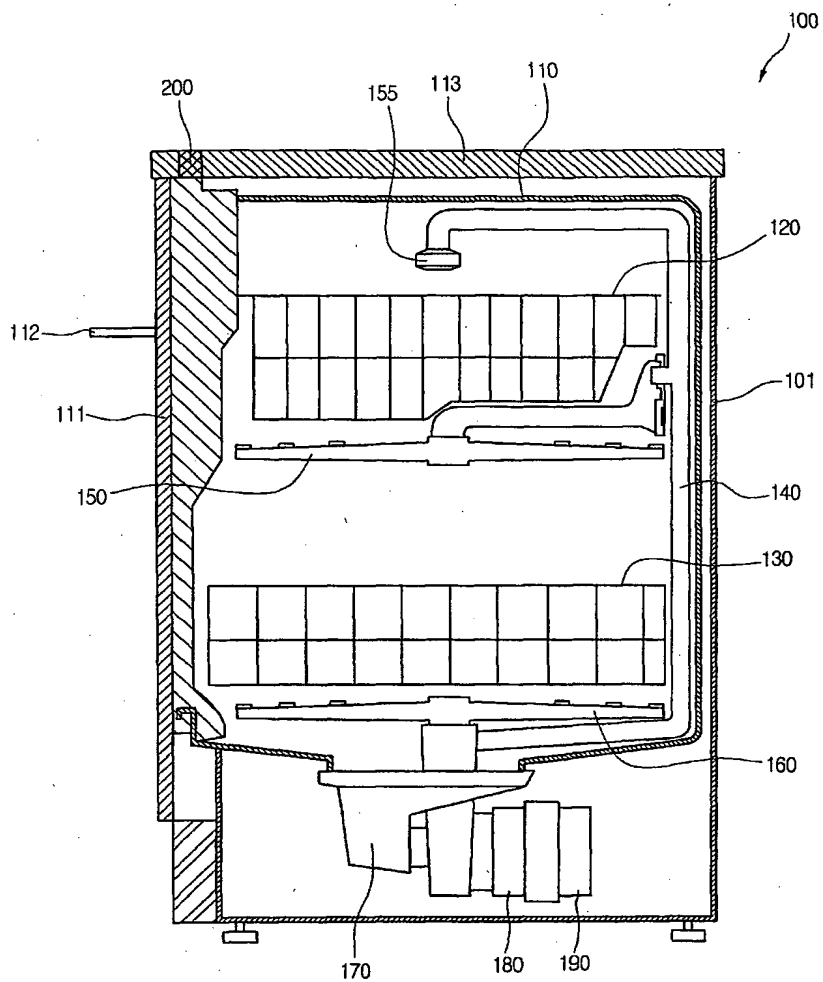
【Figure 2】



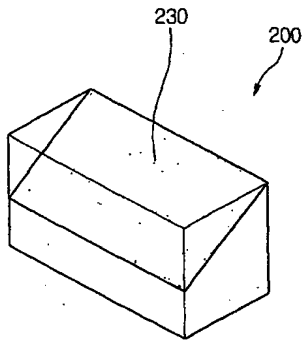
【Figure 3】



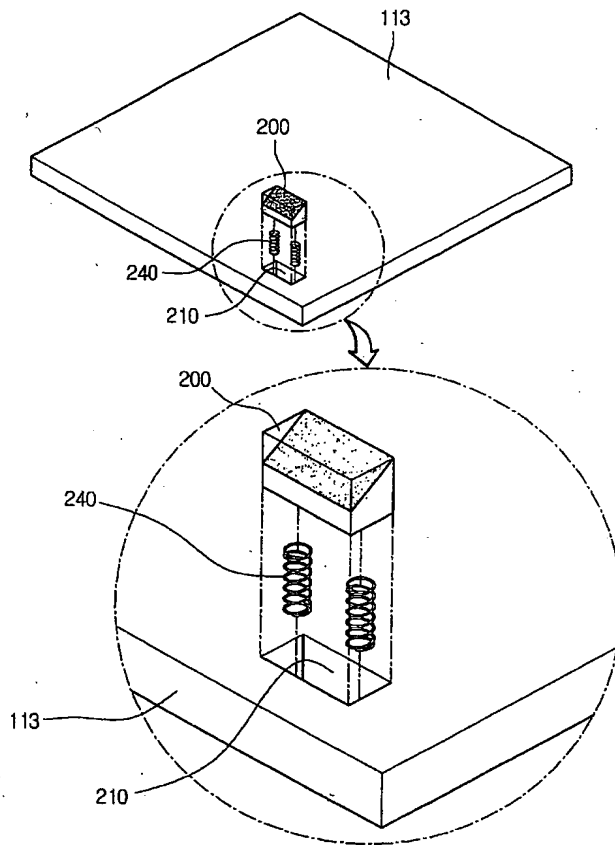
【Figure 4】



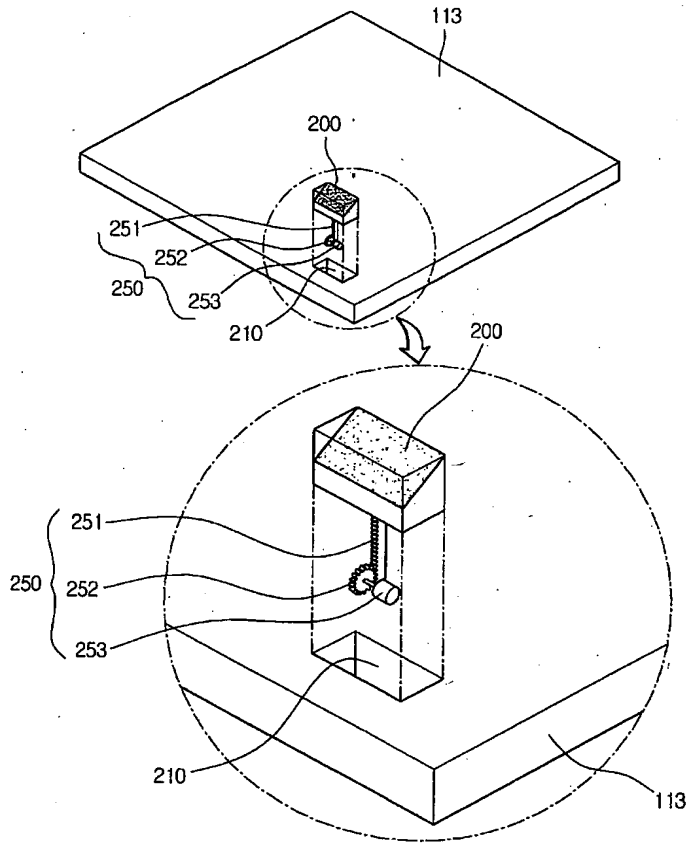
[Figure 5]



【Figure 6】



【Figure 7】



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2005/001271**A. CLASSIFICATION OF SUBJECT MATTER****IPC7 A47L 15/42**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 D06F, A47L, G01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and applications for inventions since 1975

Utility models and applications for Utility Models since 1975

Japanese Utility Models and applications for Utility Models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKIPASS**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	EP 1151717 A2 (MIELE & CIE) 7 November 2001 see abstract; figure 2 see the whole document	1-4, 16-17 5-15, 18-20
Y A	GB 2256280 A (ZANUSSI ELETTRODOMESTICI) 16 December 1992 see abstract; figure 1 see the whole document	1-4, 16-17 5-15, 18-20
Y	KR 20-0324551 Y1 (Lee Sang Gi et al.) 25 August 2003 see abstract; figure 2	1-4, 16-17
A	JP 2002345717 (MATSUSHITA ELECTRIC IND CO LTD) 3 December 2002 see abstract	1, 16



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

16 AUGUST 2005 (16.08.2005)

Date of mailing of the international search report

17 AUGUST 2005 (17.08.2005)

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2005/001271

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP1151717A2	07.11.2001	AT256418E	15.01.2004
		DE10022206A1	21.02.2002
		DE10022206C2	13.06.2002
		DE50101167C0	29.01.2004
		EP01151717A2	07.11.2001
		EP01151717A3	17.04.2002
		EP01151717B1	17.12.2003
		EP1151717A3	17.04.2002
		EP1151717B1	17.12.2003
		EP1151717A2	07.11.2001
GB2256580A	16.12.1992	GB2256580A1	16.12.1992
		GB2256580B2	02.11.1994
		GB9211543A0	15.07.1992
KR 20-0324551. Y1	25.08.2003	None	
JP 2002345717A	03.11.2002	None	